

AVIATION MEDICINE TRANSLATIONS:

Annotated Bibliography of Recently
Translated Material. V.

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FOREWORD

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Ammon, R. Die fermentative Spaltung des Acetylcholins. (The fermentative fission of acetylcholine.) *Pflüg. Arch. Ges. Physiol.*, 233: 486-491, 1933-1934.

A new method is described for the demonstration of cholinesterase, the enzyme which hydrolyzes acetylcholine into choline and acetic acid. The process followed the Warburg method.

Experiments with added substances show that physostigmine, prostigmine and gynerges, which retard totally the fermentative hydrolysis of acetylcholine which has been demonstrated by other biological methods, are extraordinarily strong retarding substances for cholinesterase. Of the investigated vegetatively effective substances, muscarine also has a strong retarding influence on the enzyme. A series of other substances retards the acetylcholine fission only in higher concentration (milligram doses).

Some experiments with esterase preparations of various origins indicate strongly that cholinesterase should be considered a special enzyme. (Translated Summary.)

Cenacchi, V., Fenu, G. and Gabrielli, L. L'azione dell' amfetamina sulla risposta nistagmica da stimoli rotacceleratori. Studio sperimentale condotto sul coniglio. (Effect of amphetamine on the nystagmic response to angular acceleratory stimuli. Experimental study carried out in rabbits.) *Bollettino della Societa' Italiana di Biologia Sperimentale (Napoli)*, 41(No. 10): 527-530, 1964.

At doses of 0.5 and 1 mg/kg of body weight, the authors observed a rather significant decrease in the nystagmic response; higher doses (3 mg/kg) always led to a significant decrease in the nystagmic response; at the dose of 19 mg/kg (sic), an almost complete disappearance of all response was noted. (Translated Results.)

de Brisson, A. and Brémond, J. Pilotage militaire et psychologie expérimentale. (Military piloting and experimental psychology, Part I.) *Forces Aériennes Françaises*, 20(No. 222): 185-218, 1966.

This represents a synthesis of the work done by the Center of Psychological Studies and Instruction of the Air Force. Major topics covered in detail include recruiting and selection of flying personnel, pilot aptitude and testing methods, limitations of predictors, aptitude and motivation in accordance with recruitment categories, and pilot-navigator recruiting at the level of the major schools.

de Brisson, A. and Brémond, J. Pilotage militaire et psychologie expérimentale. (Military piloting and experimental psychology, Part II.) *Forces Aériennes Françaises*, 20(No. 223): 299-318, 1966.

The topics covered in this part include: (1) training and adaptation in the school for pilots; (2) smooth transition of advancement (curricula and the beginnings of pilot study; contributions of programmed instruction); (3) standardization of grading; (4) experimental possibilities in the area of pedagogical principles; (5) attitudes of student pilots and evolution of motivation (first studies; evaluation of attitude changes); and (6) attempt at an interpretation of the changes in attitude (use of psycho-sociological model for predictive purposes, motivation of candidates, motivation of students and development of attitudes, social pressures in the elementary school and motivation).

de Brisson, A. and Brémond, J. Pilotage militaire et psychologie expérimentale. (Military piloting and experimental psychology, Part III and Conclusion.) *Forces Aériennes Françaises*, 20(No. 224): 421-437, 1966.

Under the general heading of "Aspects of Professional Life" are included the following

topics: (1) renewal of contract; (2) conditions of employment; (3) apprehension and fatigue; (4) comfort of airplanes; (5) team spirit; and (6) style of life and military context. A "Conclusions and Prospectives" section provides a brief overview of the three parts of the study.

Fedotenkov, A. G., Danilov, L. A. and Popov, L. D. Study of historical changes in cadaver skin during the process of its preservation in solution. (in Russian) *Problemy gematologii i perelivaniia Krovi*, 7:44-47, 1962.

A study of morphological changes developing in skin during the process of its preservation in some fluid media is presented. Findings from historical examinations of skin removed from cadavers are discussed.

Haas, E., Kraenbring, Chr. and Pfänder, H. Drehreizschwellenbestimmung und überschwellige Labyrinthregbarkeitsprüfung bei Normalpersonen. (Rotatory threshold determination and superthreshold tests of labyrinthine excitability in normal persons.) *Zeitschrift für Laryngologie, Rhinologie, Otologie*, 44(3): 180-189, 1965.

Forty-seven normal subjects were examined by the rotatory threshold, caloric, and prolonged rotation tests, to determine their diagnostic value and any significant connection between the various vestibular reactions. A statistically significant relation was found between threshold values and the variable values of "total amplitude" of the caloric or rotatory nystagmus. The "duration" of the nystagmus is the most reliable criterion in the evaluation of experimental nystagmus but no striking relationship could be demonstrated between the duration values and the threshold figures.

These experimental results and the authors' long experience throw much doubt on the value of the rotatory threshold test in the clinical investigation of vestibular disturbances. This is supported by hitherto unpublished studies of directional preponderance of nystagmus. Caloric testing with hot and cold stimuli as well as prolonged rotation yielded much more conclusive evidence in the evaluation of post-rotatory nystagmus II than that obtained by threshold tests. (Modified English Summary.)

Hasselmann, M., Schaff, G. and Metz, B. Influences respectives du travail, de la température

ambiante et de la privation de sommeil sur l'excrétion urinaire de catécholamines chez l'homme normal. (Respective influences of work, of surrounding temperature and of sleep deprivation on urinary excretion of catecholamines of normal man.) *Comptes rendus Société Biologie*, 16: 197-201, 1960.

A report is made of the excretion of adrenaline and noradrenaline during a pre-fatigue period, a fatigue period, and a post-fatigue period. Fatigue was induced by (a) muscular work, (b) thermal environment, and (c) sleep deprivation.

Høygaard, A., Holm, H. and Rodahl, K. Latent hemeralopi hos sjöfolk. (Latent night blindness in seamen). *Nordisk Hygienisk Tidskrift*, 123-146, 1940.

Reduced night vision caused by vitamin A deficiency occurs among North European seamen. This can probably be corrected by simple changes in the dietary directive of 15 October 1937, which is now in force. It is suggested that the consumption of milk products, eggs, codfish roe, and brisling be increased. It is also suggested that tropical margarine and perhaps other food products be vitamin enriched.

The question of improving the night vision of seamen is of particular interest to Norway, not only because of its relatively large fleet, but also because its coast is difficult to navigate. Large sums have been invested in the lighthouse system, but attention should also be directed toward factors affecting the visual perception of the lights.

There is also reason for believing that hemeralopia occurs among Norwegian fishermen. The fishing vessels often navigate waters where there are no lighthouses, and such navigation makes great demands on night vision.

The authors call to the attention of military surgeons the result of these investigations, which perhaps may be of special interest to the Navy. It is also believed that keen eyesight would be of interest to those concerned with accuracy in use of weaponry.

It is suggested that studies be initiated on a broader basis than in the present work. (Translated Conclusions.)

Hustin, A. Troubles de l'audition chez le personnel navigant civil. (Hearing difficulties in

civil aviation personnel.) *Revue de Médecine Aéronautique*, 4(15): 50-51, 1965.

There is a need for regular audiometric checks and for the indoctrination of flying personnel who must be habituated to avoid tubal difficulties and encouraged to consult an otorhinolaryngologist from the very beginning of these difficulties.

Maximal measures must be applied immediately to recover hearing and to avoid re-occurrences of difficulties.

If these precautions are taken, it can be assumed that auditory difficulties in civil aviation will not be greater than those of the entire population.

The pathology of sound trauma has clearly shown that the injuries are rapidly permanent and that prevention is the best weapon for coping with this problem. Prevention requires well-organized planning and implementation from the very outset of employment as well as good comprehensive checks during the entire career of each employee. (Translated Conclusion.)

Jansen, G., Rutenfranz, J. and Singer, R. Über eine circadiane Rhythmik sensumotorischer Leistungen. (On circadian rhythm of sensorimotor performance.) *Internationale Zeitschrift für angewandte Physiologie*, 22: 65-83, 1966.

A survey of the literature dealing with the circadian rhythm of sensorimotor functions of men is given, and experiments of 24 hours daily duration are reported. The experiments were carried out with two trained male subjects during 12 days. At 2-hour intervals the subjects had to perform a twofold task for 10 minutes, consisting of a tracking-task at Graf's driving apparatus and simultaneous addition of two-digit numbers. The results of the experiments indicated that the tracking as well as the adding performance varied according to the time of day; the peaks and troughs of the performance of both tasks did not coincide temporally. If one combines the results of both tasks, a circadian rhythm could be shown for the demanded twofold task in spite of intra- and inter-individual variations. Statistical examination showed a period of reduced performance in both tasks from 4:00 A.M. until 8:00 A.M.; and a period of increased performance for the adding task from 10:00

A.M. until 2:00 P.M., and for the tracking-task from 6:00 P.M. until 10:00 P.M. Also the qualitative changes in the tracking-task concerning the more or less flexible adaptation of "driving-speed" to the difficulties of the course of the curve, showed a dependency on the time of day. The findings are discussed in comparison with results of other authors. It is noted that circadian rhythm should be accounted for in the comparison of results of sensory-motor experiments as well as in practical sensory-motor activities. (Translated Summary.)

Jatho, K. Die Wirkung der Alkoholintoxikation auf den Vestibularapparat unter besonderer Berücksichtigung der Störungen der vestibulär-oculomotorischen Regelfunktion. I. Mitteilung: Kritische Betrachtung und Deutung nystagmischer Phänomene. (The effect of alcohol intoxication upon the vestibular apparatus with special emphasis on disorders of the vestibulo-oculomotor regulatory function. 1. Critical consideration and interpretation of nystagmic phenomena.) *Zeitschrift für Laryngologie, Rhinologie, Otologie*, 44: 1-15, 1965.

The effect of alcohol on human performance constitutes a medical and legal problem. The blood alcohol concentration is generally regarded as a reliable yardstick in determining the degree of reduction of all functions in relation to automobile traffic. The vestibular apparatus and those systems which react to it are particularly sensitive to the effects of alcohol. The data reported in the literature relating to the vestibular apparatus are critically discussed and their origins clarified. The spontaneous horizontal nystagmus, the facilitation of nystagmus, and its sensitive earlier stage of terminal deviation nystagmus occur only sporadically, and with high blood alcohol levels. The increased duration of rotational nystagmus, as well as a shortened latent period and an increased duration of caloric nystagmus, are due to the same causes. These are seen as a failure of the eye-centering mechanism, that regulating force of the rapid phase of the nystagmus, which then frees the slow component and allows the eyes to drift. Thus the apparent hyperexcitability of the labyrinth is shown to be a paretic phenomenon. These variable nystagmic symptoms which are of

little pathological significance when compared with normal data make the tests unsuitable as forensic tests of alcohol intoxication. The only reliable vestibular symptom is the positional alcohol nystagmus, which is also of value in assessing the approximate time of consumption of the alcohol. The differential diagnostic value of this form of nystagmus is stressed. The biphasic appearance of the positional alcohol nystagmus resembles the behavior of the peripheral and probably also cerebral circulation, and there is probably a causative association present here.

The essential action of alcohol on the vestibular-oculomotor mechanism is a subjectively perceptible disturbance in normal eye position and not in the various forms of nystagmus with their many abnormal features. These oculomotor disturbances are not detectable by the usual vestibular tests, and their features are described and analyzed. The feeling of swinging in alcoholic intoxication is to be attributed to a disturbance of the bodily equilibrium and the apparent movement of visual surroundings. These functional disturbances lead to a diminution of the perceptive functions and also to a loss of competence amid road traffic. (Modified English Summary.)

Jatho, K. Die Wirkung der Alkoholintoxikation auf den Vestibularapparat unter besonderer Berücksichtigung der Störungen der vestibuläroculomotorischen Regelfunktion. II. Mitteilung: Ergebnisse experimenteller Untersuchungen. (The effect of alcohol intoxication upon the vestibular apparatus with special emphasis on disorders of the vestibulo-oculomotor regulatory function. 2. Results of experimental investigations.) *Zeitschrift für Laryngologie, Rhinologie, Otologie*, 44:104-118, 1965.

Part 1 of this communication stresses that the chief effect of alcohol on the vestibular-oculomotor system consists of a subjectively perceptible displacement of objects in the field of vision. These disturbances cannot be confirmed by spontaneous or test-induced vestibular signs. To demonstrate these effects, several experimental subjects 18-35 years old, and of different weights and bodily stature, were studied. The subjective disturbances depend on oculomotor effects resulting from a vestibular

defect, and they were successfully demonstrated. They consist of a failure of the eyes to maintain position, identical with the slow phase of perrotatory nystagmus. The functional disturbance is identical to that of labyrinthine failure, and may be recorded photo-optically by moving objects, which vary in size and speed, horizontally across the subjects' visual field. An abnormal increase in amplitude of the ocular curve indicates a partial or complete failure of ocular movement, directed against the movement of the head. The degree of failure increases with the speed and size of the head movements. Thus pedestrians and drivers under the influence of alcohol can no longer perceive, with sufficient accuracy to make them competent in traffic situations, the position and direction of objects in their visual field while their own head and body are moving. It is to be noted that these disturbances begin with quite low alcohol blood levels of 0.5%, and are already well marked at concentrations of 1.0%. (Modified English summary.)

✓Klein, K. E., Brüner, H. and Ruff, S. Untersuchungen zur Belastung des Bordpersonals auf Fernflügen mit Düsenmaschinen. (Investigations of stress among air crews on long-distance jet aircraft flights.) *Zeitschrift für Flugwissenschaften*, 14 (No. 2): 109-121, 1966.

Aircrews' fatigue has often been discussed since the introduction of jet aircraft into the civil air traffic, but only a few attempts have been made so far to measure it practically. Now, a conception of its magnitude can be obtained by comparative measurements of psychophysiological parameters in aircrew members during regular transatlantic flights and in a control group during sedentary activity at a single location. The results seem to allow a quantitative evaluation of the physiological aspects of professional stress on various flight routes. They add, moreover, to the knowledge of a possible impairment of flight safety by stressful flights during certain hours of the day. (Modified English Summary.)

✓Klein, K. E., Brüner, H. and Ruff, S. Untersuchungen zur Belastung des Bordpersonals auf Fernflügen mit Düsenmaschinen: Bericht über die Ergebnisse auf der Nordatlantikroute. (Investigations on stress imposed on aircrew

in civil jet aircraft during long-range flight. Report on results on the Northern Atlantic Route.) *Deutsche Luft-und Raumfahrt, Forschungsbericht* 65-44 (German Aeronautics and Astronautics, Research Report 65-44, October 1965).

Investigations were performed on the stress level which affects aircrews of German airlines (DLH) during long distance flights on jet aircraft. The results form the basis for evaluating the physiological workload on the investigated flight routes, and yield new knowledge concerning the influence of strenuous flights during certain day/night hours upon flight safety. (Translated Summary.)

Koch, C. and Castaigluolo, P.. Considerazioni sulla valutazione del danno acustico e vestibolare nei piloti e negli specialisti della Aeronautica Militare. (Observations on diagnosis of acoustical and vestibular damage in Air Force pilots and ground crews.) *Minerva Medica*, 56: 3832-3835, 1965.

This brief report on a topic of considerable complexity is based on the authors' experience and opinions, and is meant to draw attention to the forensic aspects of acoustico-vestibular trauma. The authors commend what has already been done in the aeronautic field, but also propose several reminders which they feel are necessary for the protection of such highly specialized and hence, particularly valuable personnel.

In the authors' opinion, the problem can be approached and solved satisfactorily on the basis of the following points:

1. increase the existing areas of collaboration among otologists, neurologists, psychologists, and forensic specialists at the medico-legal institutes;

2. foster and encourage closer collaboration between these specialists and acoustical engineers and physicists, in order to provide easier solutions to problems of "noise sources";

3. publicize the medical, scientific, and technical aspects of such problems to all personnel exposed to the hazards that might cause hearing impairment;

4. issue all known protective devices to exposed personnel, in order to provide maximum protection against noise trauma;

5. conduct stringent tests at regular and frequent intervals among all flight personnel and all ground personnel exposed to high noise levels, to provide early diagnosis of auditory or vestibular malfunction;

6. write into law a provision for compensation for service-connected auditory or vestibular disability, in addition to the present severance indemnity. (Translated Summary.)

✓ Lavernhe, J., Lafontaine, E. and Laplane, R. Les effets subjectifs des décalages horaires: Une enquête auprès du personnel navigant d'Air-France. (The effects of time zone changes on individuals: An investigation among flying Air France personnel.) *Revue de Médecine Aéronautique*, 4(No. 15): 30-36, 1965.

- (1) The importance of the problem of the physiopathological disorders resulting from time zone changes is attested by the fact that 78% of crew members suffer from it to some extent, whether the problem involved is their sleep (most frequently), their digestion, or both. But, the changes of time zones are probably not the only ones responsible for the troubles mentioned. The climatic variations, the changes in night environment, the increase in the time of rest in America, unaccustomed diet, nervous tension, and night flying certainly play an important role.

- (2) Whether it be a question of flights to America or return flights to France, the majority of the flying personnel adapt themselves to their new life pattern at the end of 48 hours, but a significant minority, about 30%, claims to need 3 nights or more in order not to feel any lingering effects of the time change.

- (3) The youngest individuals suffer less from time changes and live more at ease during the stopover. Age and experience playing a part, a larger number of individuals try to preserve the life pattern of their country of origin during the entire trip and appear, because of that, to bear the changes in time zones better. They prefer a short stopover on the American continent (1 night and 1 day) for, beyond that, it is more and more difficult to ignore local time. The effects of time changes are then felt more strongly and, on returning, it is necessary to get accustomed once more to the life schedule of the country of origin. On the other hand, it is better to reduce the dura-

tion of the rest period during the stopover for the sake of relaxation in the accustomed environment, which is always more beneficial.

(4) Stays on the American Continent ranging from 3 to 7 days are certainly the most difficult as regards the effects of time zone changes, for the body is subject successively and totally to problems of adjustment in the two directions. This must be avoided as much as possible.

(5) Irregular time changes are particularly trying. It may happen that a flight to Tokyo (GMT + 9) is followed after 48 hours of rest in Paris by a flight to Los Angeles (GMT-8). Sometimes these complex changes in schedule may be the origin of neurological disorders and metabolic and fatigue disorders that may be countered only by prolonged rest. It is thus desirable to assign crew members to a specific sector involving relatively homogeneous time changes so as to avoid, as much as possible, the irregular changes of time zones.

(6) The performance of crews in the air, when expressed in terms of flying hours, does not take sufficient account of work assignments. In the course of an eventual revision of the procedures of flight schedules in which various factors could have a bearing, the authors feel that the hours of flight from east to west, or vice versa, should be weighted with an incremental coefficient that would give them more credit than would the hours flown in a north-south direction for computations of professional activity.

(7) The advent of supersonic passenger planes should allow the crews to do the round trip during the same day in 6 hours of flying time and to eliminate, simultaneously, all problems of time changes, at least over the North Atlantic route. (Translated Comments and Conclusions.)

Lehwess-Litzmann, I. Illusionen in Fluge-Eine Literaturstudie zur Problematik der Flugzeugführung. (Illusions in flight—A review of the literature on the problem of aircraft piloting.) *Verkehrsmedizin und Ihre Grenzgebiete*, 12:577-590, 1965.

On the basis of previous literature and pilots' reports, a summary of phenomena of illusions during flight has been attempted. In addition to a classification and enumeration of visual

and nonvisual illusions, physiological relationships and processes are indicated, as well as preventive measures. This paper is intended to provide the pilot with better information about the possible occurrence of illusions and to inform the layman of the difficulties which a pilot may encounter. (Translated Summary.)

Memma, N. Gli aiuti visuali aeroportuali dai primi voli notturni ai più moderni orientamenti per il volo in condizioni di bassa visibilità. (Visual aids in airports from the first night flights to the most recent orientation devices for flights under conditions of low visibility.) *Revista Aeronautica*, 42(No. 2): 179-213, 1966.

This study proposes (a) to define the requirements which aviation visual aids must satisfy and (b) to evaluate the limits of their practical use. A history of these aids is outlined starting with the first luminous devices used in airports. The gradual definition of present-day requirements is traced and an analysis of the elements needed by the pilot to execute landing maneuvers under conditions of low visibility is presented. Technical criteria, on the basis of which the configurations of visual aids should be designed and constructed, are offered. The problem of fog dispersal is also considered.

Nikolaides, R. and Dontas, S. Über die Erregbarkeit des Wärmesentrums. (The excitability of the heat center.) *Zentralblatt für Physiologie*, 25:192-199, 1911.

These studies can be summarized as follows:

1. The threshold (temperature level) at which polypnea appears depends upon the excitability of the heat center.

2. The excitability of the heat center and consequently the threshold of excitability (temperature), can be altered (raised or lowered) by various agents.

3. By increasing the excitability of the heat center (by lowering of the threshold of excitability), polypnea appears at a lower body temperature: by lowering the excitability of the center (by increasing the threshold of excitability) polypnea appears at a higher body temperature.

4. It is very possible that the elevation of body temperature, which is produced by the action of bacterial metabolites, produces a depression of the heat center and not an excita-

tion of that center as was previously believed. If, instead, there is a stimulation of the heat center, one would expect the threshold of stimulation to be lower.

Fever is explained by a depression of the heat center, and the body temperature at which the regulation becomes steady is altered depending on the degree of the depression.

5. The antipyretics lower body temperature because they increase the excitability of the heat center. (Translated Conclusions.)

Schoder, H. J. Nachweis vestibulärer Regulationsstörungen nach Schädelhirntraumen. (Diagnosis of disturbances of vestibular function after head trauma.) *HNO; Wegweiser für die Fachärztliche Praxis* (Berlin) 13:25-27, 1965.

The report covers 165 patients with skull and brain trauma. The subjective dizzy spells could be objectivized in all cases. The authors point out the importance of making an ear examination as soon as possible after the accident; they also stress the importance of a detailed search for spontaneous nystagmus and for latent spontaneous nystagmus produced by the situation and positioning test. It would appear best to document a central regulatory disturbance by means of the rotatory test involving the electronic registration of the nystagmus. (Translated Summary.)

Smirnov, M. S. and Bongard, M. M. Threshold and colorimetric methods for studying color vision. (In Russian) *Biofizika*, 1:158-162, 1956.

A comparison of limits of applicability of the colorimetric and threshold methods of study of color vision, and, also an appraisal of their advantages and disadvantages are presented.

Vartbaronov, R. A. and Volokhova, N. A. Features of human adaptation to prolonged Coriolis acceleration. (In Russian) *Izvestiya, Akademii Nauk SSSR, Seriya Biologicheskaya*, No. 4:500-506, 1965.

During experiments on men, some vegetative, somatic, and sensory reactions arising under the long action of Coriolis accelerations of low value were studied. Under rotation in the MVK-1 at the rate of 1.8 and 3.5 rotations per minute, an adaptation occurred which was evaluated by subjective reports and objective indices of physiological reactions. The authors recommend the methods of evaluation of work capacity, peripheral blood circulation, and oculomotoric reaction for use as criteria for adaptation. The authors suggest that this approach allows one to produce in the laboratory an habituated syndrome of sea-sickness in long experiments, which may be used to increase the effectiveness of vestibular training. (Modified Summary Abstract.)

Yoshihara, M. Study of objective measurement of color vision—Report 2. (In Japanese) *Folia Ophthalmologica Japonica (Osaka)*, 13:598-610, 1962.

The color vision of subjects with green and red color blindness was measured objectively by optokinetic pendular nystagmus induced by the author's apparatus.

The optokinetic nystagmus was recorded by the electro-nystagmograph.

In Report 1, a color test tablet with a checkered pattern (Screening Table, Classification Table, Degree Table) was used, but the present report concerns the use of mixed pattern (width 6 mm, length 7 mm).

The results showed that the electro-nystagmograms of color blindness were irregular in type and height of waves and in frequency and amplitude of oscillation.

Thus, the author was able to screen and classify the degrees of color blindness within the range of this examination.

The use of the mixed pattern tablet proved more stable than the striped pattern in electro-nystagmograms. (Translated Summary.)
